

Planetary Geology in Three Dimensions: Results from the Mars Orbiter Laser Altimeter

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The Mars Orbiter Laser Altimeter (MOLA) has revolutionized our understanding of geological features and processes on Mars. This instrument has been measuring the topography, surface roughness, and 1-micron reflectivity of the surface, as well as the heights of clouds for the past three years. The intrinsic horizontal resolution, vertical precision and accuracy of the system are 300 m, 40 cm, and 1 m respectively, and the current global topographic grid has a resolution of 1 km by 2 km at the equator, increasing toward the poles. This data set has given us an unprecedented tool for studying the surface of another planet in three dimensions. In this talk I will review a variety of studies in which MOLA data has played a key role, including planetary shape and internal structure, crater morphology, wrinkle ridge structure, surface slopes and roughness, polar processes, the tectonic evolution of Mars, hydrology, and the possible existence of ancient oceans.